The exact nature of the critical anomaly in the refractive index $n$ of binary liquid mixtures in the homogeneous phase near the critical point has been the subject of a controversy during the 90’s [1,2]. The issue being whether besides an expected density related anomaly (usually quite small) also an intrinsic (electric field related) contribution is present. To date, experimental evidence for an intrinsic effect is restricted to the system triethylamine + water [1] and two microemulsions [3,4]. In this work, we revisit this issue in the framework of complete scaling formulation [5,6] with the aim of providing answers to the following questions: can the behavior of $n$ near the liquid-liquid critical point (in the homogeneous phase and in the two-phase region) be described in terms of a scaling formulation in the same way as recently done for the dielectric constant $\varepsilon$ [7,8]. If so, which anomalies can be expected and from where do they arise? Why are the observed anomalies typically small and how do they compare to the remaining physical densities? To this end we resort to two alternative approaches: the Maxwell equation and the Lorentz-Lorenz relation. A comprehensive analysis of presently available literature data is carried out within the provided theoretical predictions.